THE JOURNAL
OF
APPLIED ECOLOGY

EDITED FOR THE
BRITISH ECOLOGICAL SOCIETY

BY
T. M. ROBERTS AND J. A. WALLWORK

EDITORIAL BOARD

A. D. BRADSHAW J. P. COOPER R. W. EDWARDS
R. S. GLOVER P. H. LOVELL R. MEAD
J. L. MONTEITH M. G. MORRIS A. J. RUTTER
J. I. SPRENT V. C. WYNNE-EDWARDS

VOLUME 19

1982

BLACKWELL SCIENTIFIC PUBLICATIONS
OXFORD LONDON EDINBURGH BOSTON MELBOURNE
1982

PUBLISHED BY BLACKWELL SCIENTIFIC PUBLICATIONS LTD, OSNEY MEAD, OXFORD

Printed in Great Britain by Spottiswoode Ballantyne Ltd., Colchester and London

CONTENTS

ORIGINAL PAPERS PAGE

Adams, J. A., Endo, A. S., Stolzy, L. H., Rowlands, P. G. & Johnson, H. B. Controlled experiments on soil compaction produced by off-road vehicles in the Mojave Desert, California 167
Alex, J. F. See **Cullen, J. M.**
Anderson, T. J. & Barrett, G. W. Effects of dried sewage sludge on meadow vole (*Microtus pennsylvanicus*) populations in two grassland communities 759
Andersson, A. & Danell, K. Response of freshwater macroinvertebrates to addition of terrestrial plant litter 319
Andre, H. M., Bolly, C. & Lebrun, Ph. Monitoring and mapping air pollution through an animal indicator: a new and quick method 107
Baker, R. H. See **Ollerenshaw, J. H.**
Barclay, H. J. Models for pest control using predator release, habitat management and pesticide release in combination 337
Barnes, R. F. W. & Douglas-Hamilton, I. The numbers and distribution patterns of large mammals in the Ruaha-Rungwa area of Southern Tanzania 411
Barnhill, M. A. See **Farmer, R. E. Jr**
Barrett, G. W. See **Anderson, T. J.**
Bazzaz, F. A., Levin, D. A. & Schmierbach, M. R. Differential survival of genetic variants in crowded populations of *Phlox* 891
Blom, C. W. P. M. See **Noë, R.**
Bloomfield, H. E., Handley, J. F. & Bradshaw, A. D. Nutrient deficiencies and the aftercare of reclaimed derelict land 151
Bolly, C. See **Andre, H. M.**
Bradshaw, A. D. See **Bloomfield, H. E.**
Bradshaw, A. D. See **Costigan, P. A.**
Bryan, K. A. An investigation of some factors influencing the performance of a recreational trout fishery 113
Burt, R. L. See **Williams, W. T.**
Cammell, M. E. See **Way, M. J.**
Carman, J. G. A non-destructive stain technique for investigating root growth dynamics 873
Cedeño-León, A. & Thomas, J. D. Competition between *Biomphalaria glabrata* (Say) and *Marisa cornuarietis* (L): feeding niches 707
Clark, T. P. & Gilbert, F. F. Ecotones as a measure of deer habitat quality in Central Ontario 751
Costigan, P. A., Bradshaw, A. D. & Gemmell, R. P. The reclamation of acidic colliery spoil. III. Problems associated with the use of high rates of limestone . 193
Crisp, J. M. See **Staines, B. W.**
Cullen, J. M., Groves, R. H. & Alex, J. F. The influence of *Aceria chondrillae* on the growth and reproductive capacity of *Chondrilla juncea* 529
Cummins, R. P. See **Miller, G. R.**
Cunningham, M. See **Farmer, R. E. Jr**

Danell, K. & Sjöberg, K. Successional patterns of plants, invertebrates and ducks in a man-made lake 395
Danell, K. See **Andersson, A.**
Davies, J. See **Howard-Williams, C.**
Davis, B. N. K. See **Lakhani, K. H.**
Davis, J. E. See **Newton, I.**
Davis, P. E. See **Newton, I.**
Deans, J. D. See **Leverenz, J.**
Denoncourt, R. F. See **Hocutt, C. H.**
Dibb, H. See **Whitehead, D. C.**
Dickinson, N. M. & Polwart, A. The effect of mowing regime on an amenity grassland ecosystem: above- and below-ground components 569
Dindal, D. L. See **Mitchell, M. J.**
Douglas-Hamilton, I. See **Barnes, R. F. W.**
Douthwaite, R. J. Changes in pied kingfisher (*Ceryle rudis*) feeding related to endosulfan pollution form tsetse fly control operaitons in the Okavango Delta, Botswana 133
Eagles, C. F., Williams, D. H. & Toler, R. J. Seasonal changes in competitive ability of contrasting populations of *Dactylis glomerata* 555
Eaton, G. W. See **Johnson, D. L.**
Edwards, C. A. & Lofty, J. R. The effect of direct drilling and minimal cultivation on earthworm populations 723
Edwards, P. J. & Hollis, S. The distribution of excreta on New Forest grassland used by cattle, ponies and deer 953
Elias, C. O. The effect of low phosphorus on nine grass cultivars for derelict land reclamation 239
Endo, A. S. See **Adams, J. A.**
Farmer, R. E. Jr, Cunningham, M. & Barnhill, M. A. First-year development of plant communities originating from forest topsoils placed on Southern Appalachian minesoils 283
Fasehun, F. E. See **Grace, J.**
Ford, E. D. See **Leverenz, J.**
Ford, R. G., Wiens, J. A., Heinemann, D. & Hunt, G. L. Modelling the sensitivity of colonially breeding marine birds to oil spills: guillemot and kittiwake populations on the Pribilof islands, Bering Sea 1
Galicka, W. See **Penczak, T.**
Gemmell, R. P. See **Costigan, P. A.**
Gibson, D. J. See **Johnson, F. L.**
Gilbert, F. F. See **Clark, T. P.**
Grace, J., Okali, D. U. U. & Fasehun, F. E. Stomatal conductance of two tropical trees during the wet season in Nigeria 659
Greenwood, H. See **Weatherhead, P. J.**
Grieve, A. See **Summers, R. W.**
Grime, J. P. See **Thompson, K.**
Grove, T. S. See **Hingston, F. J.**
Groves, R. H. See **Cullen, J. M.**
Grue, C. E., Powell, G. V. N. & McChesney, M. J. Care of nestlings by wild female starlings exposed to an organophosphate pesticide 327

Halloran, G. M. See **Kushnir, U.**
Hamilton, W. E. See **Mitchell, M. J.**
Handley, J. F. See **Bloomfield, H. E.**
Hansen, M. K. See **Risch, S.**
Hari, P. See **Kanninen, M.**
Harradine, A. R. Effect of salinity on germination and growth of *Pennisetum macrourum* in southern Tasmania 273
Hartley, R. D. See **Whitehead, D. C.**
Heinemann, D. See **Ford, R. G.**
Hilton, J. & Phillips, G. L. The effect of boat activity on turbidity in a shallow broadland river 143
Hingston, F. J., Malajczuk, N. & Grove, T. S. Acetylene reduction (N_2-fixation) by jarrah forest legumes following fire and phosphate application 631
Hocutt, C. H., Denoncourt, R. F. & Stauffer, J. R. Jr. Observations of behavioural responses of fish to environmental stress *in situ* 443
Hollis, S. See **Edwards, P. J.**
Howard-Williams, C., Davies, J. & Pickmere, S. The dynamics of growth, the effects of changing area and nitrate uptake by watercress *Nasturtium officinale* R. Br. in a New Zealand stream 589
Hunt, G. L. See **Ford, R. G.**
Hutchinson, K. J. & King, K. L. Microbial respiration in a temperate sown grassland grazed by sheep 821
Jarvis, P. G. See **Leverenz, J.**
Johnson, D. L., Lovett Doust, J. & Eaton, G. W. The effect of European canker and its spatial pattern on four apple cultivars in British Columbia 603
Johnson, F. L., Gibson, D. J. & Risser, P. G. Revegetation of unreclaimed coal strip-mines in Oklahoma. I. Vegetation structure and soil properties 453
Johnson, H. B. See **Adams, J. A.**
Kanninen, M., Hari, P. & Kellomäki, S. A dynamic model for above-ground growth and dry matter production in a forest community 465
Kellomäki, S. See **Kanninen, M.**
King, K. L. See **Hutchinson, K. J.**
Kinnaird, J. W. See **Miller, G. R.**
Knoerr, K. R. See **Sinclair, T. R.**
Kroodsma, R. L. Edge effect on breeding forest birds along a power-line corridor . . 361
Kushnir, U. & Halloran, G. M. Variation in vernalization and photoperiod response in tetraploid wheat (*Triticum turgidum dicoccoides*) ecotypes 545
Kusto, E. See **Penczak, T.**
Lakhani, K. H. & Davis, B. N. K. Multiple regression models of the distribution of *Helianthemum chamaecistus* in relation to aspect and slope at Barnack, England 621
Lauenroth, W. K. See **Sala, O. E.**
Lebrun, Ph. See **Andre, H. M.**
Leverenz, J., Deans, J. D., Ford, E. D., Jarvis, P. G., Milne, R. & Whitehead, D. Systematic spatial variation of stomatal conductance in a Sitka spruce plantation 835
Levin, D. A. See **Bazzaz, F. A.**
Lofty, J. R. See **Edwards, C. A.**

Lovett Doust, J. See **Johnson, D. L.**
Luxton, M. The ecology of some soil mites from coal shale tips 427
McChesney, M. J. See **Grue, C. E.**
Maillette, L. Structural dynamics of silver birch. I. The fates of buds 203
Maillette, L. Structural dynamics of silver birch. II. A matrix model of the bud population 219
Malajczuk, N. See **Hingston, F. J.**
Martin, M. P. L. D. & Snaydon, R. W. Root and shoot interactions between barley and field beans when intercropped 263
May, D. E., Webber, P. J. & May, T. A. Success of transplanted alpine tundra plants in Niwot Ridge, Colorado 965
May, T. A. See **May, D. E.**
Miller, G. R., Kinnaird, J. W. & Cummins, R. P. Liability of saplings to browsing on a red deer range in the Scottish Highlands 941
Milne, R. See **Leverenz, J.**
Mitchell, M. J., Parkinson, C. M., Hamilton, W. E. & Dindal, D. L. Role of the earthworm, *Eisenia foetida*, in affecting organic matter decomposition in microcosms of sludge-amended soil 805
Molinski, M. See **Penczak, T.**
Mook, J. H. & Toorn, J. van der. The influence of environmental factors and management on stands of *Phragmites australis*. II. Effects on yield and its relationships with shoot density 501
Mook, J. H. See **Toorn, J. van der**
Musabilha, V. M. M. See **Stigter, C. J.**
Newton, I., Davis, P. E. & Davis, J. E. Ravens, and buzzards in relation to sheep farming and forestry in Wales 681
Noë, R. & Blom, C. W. P. M. Occurrence of three *Plantago* species in coastal dune grassland in relation to pore-volume and organic matter content of the soil . . 177
Norris, I. B. & Thomas, H. The effect of droughting on varieties and ecotypes of *Lolium*, *Dactylis* and *Festuca* 881
Okali, D. U. U. See **Grace, J.**
Ollerenshaw, J. H. & Baker, R. H. Low temperature growth in the field of *Trifolium repens* ecotypes from northern latitudes 519
Parish, T. See **Staines, B. W.**
Parkinson, C. M. See **Mitchell, M. J.**
Penczak, T., Galicka, W., Molinski, M., Kusto, E. & Zalewski, M. The enrichment of a mesotrophic lake by carbon, phosphorus and nitrogen from the cage aquaculture of rainbow trout, *Salmo gairdneri* 371
Phillips, G. L. See **Hilton, J.**
Pickmere, S. See **Howard-Williams, C.**
Pitman, R. M. See **Roberts, J.**
Pollard, F. Light induced dormancy in *Bromus sterilis* 563
Polwart, A. See **Dickinson, N. M.**
Powell, G. V. N. See **Grue, C. E.**
Prestidge, R. A. The influence of nitrogenous fertilizer on the grassland Auchenorrhyncha (Homoptera) 735
Reid, C. P. P. See **Sala, O.E.**
Risch, S. J. & Hansen, M. K. Plant growth, flowering phenologies and yields of corn, beans and squash grown in pure stands and mixtures in Costa Rica 901

Risser, P. G. See **Johnson, F. L.**
Roberts, J., Pitman, R. M. & Wallace, J. S. A comparison of evaporation from stands of Scots pine and Corsican pine in Thetford Chase, East Anglia . . . 859
Rowlands, P. G. See **Adams, J. A.**
Runeckles, V. C. Relative death rate: a dynamic parameter describing plant response to stress 295
Sala, O. E., Lauenroth, W. K. & Reid, C. P. P. Water relations: a new dimension for niche separation between *Bouteloua gracilis* and *Agropyron smithii* in North American semi-arid grasslands 647
Schmierbach, M. R. See **Bazzaz, F. A.**
Shute, D. A. & West, N. E. Two basic methodological choices in wildland vegetation inventories: their consequences and implications 249
Sinclair, T. R. & Knoerr, K. F. Distribution of photosynthetically active radiation in the canopy of a loblolly pine plantation 183
Sjöberg, K. See **Danell, K.**
Snaydon, R. W. See **Martin, M. P. L. D.**
Sohlenius, B. Short-term influence of clear-cutting on abundance of soil-microfauna (Nemotoda, Rotatoria and Tardigrada) in a Swedish pine forest soil 349
Staines, B. W., Crisp, J. M. & Parish, T. Differences in the quality of food eaten by red deer (*Cervus elaphus*) stags and hinds in winter 65
Stauffer, J. R. Jr. See **Hocutt, C. H.**
Stigter, C. J. & Musabilha, V. M. M. The conservative ratio of photosynthetically active to total radiation in the tropics 853
Stolzy, L. H. See **Adams, J. A.**
Sullivan, D. S. See **Sullivan, T. P.**
Sullivan, T. P. & Sullivan, D. S. Responses of small mammal populations to a forest herbicide application in a 20-year-old conifer plantation 95
Sullivan, T. P. & Sullivan, D. S. The use of alternative foods to reduce lodgepole pine seed predation by small mammals 33
Summers, D. D. B. The survival of bullfinches on cultivated fruit buds 813
Summers, R. W. & Grieve, A. Diet, feeding behaviour and food intake of the upland goose (*Chloëphaga picta*) and ruddy-headed goose (*C. rubidiceps*) in the Falkland islands 783
Sunderland, K. D. See **Chambers, R. J.**
Thomas, H. See **Norris, I. B.**
Thomas, J. D. See **Cedeño-León, A.**
Thomson, B. K. See **Weaver, S. E.**
Tinker, S. See **Weatherhead, P. J.**
Toler, R. J. See **Eagles, C. F.**
Toorn, J. van der & Mook, J. H. The influence of environmental factors and management on stands of *Phragmites australis*. I. Effects of burning, frost and insect damage on shoot density and shoot size 477
Toorn, J. van der. See **Mook, J. H.**
Vickerman, G. P. See **Chambers, R. J.**
Walker, T. A. Use of a Secchi disc to measure attenuation of underwater light for photosynthesis 539
Wallace, J. S. See **Roberts, J.**
Ward, L. K. The conservation of juniper: longevity and old age 917
Warwick, S. I. See **Weaver, S. E.**

Way, M. J. & Cammell, M. E. The distribution and abundance of the spindle tree *Euonymus europaeus* in southern England with particular reference to forecasting infestations of the black bean aphid, *Aphis fabae* 929
Weatherhead, P. J., Tinker, S. & Greenwood, H. Indirect assessment of avian damage to agriculture 773
Weaver, S. E., Warwick, S. I. & Thomson, B. K. Comparative growth and atrazine response of resistant and susceptible populations of *Amaranthus* from southern Ontario 611
Webber, P. J. See **May, D. E.**
West, N. E. See **Shute, D. A.**
Whelan, R. J. Response of slugs to unacceptable food items 79
Whelan, R. J. An artificial medium for feeding choice experiments with slugs . . . 89
Whitehead, D. C., Dibb, H. & Hartley, R. D. Phenolic compounds in soil as influenced by the growth of different plant species 579
Whitehead, D. See **Leverenz, J.**
Wiens, J. A. See **Ford, R. G.**
Williams, D. H. See **Eagles, C. F.**
Williams, W. T. & Burt, R. L. A re-appraisal of Hartley's Agrostological Index . . 159
Wyatt, I. J. See **Chambers, R. J.**
Young, A. M. Effects of shade cover and availability of midge breeding sites on pollinating midge populations and fruit set in two cocoa farms 47
Zalewski, M. See **Penczak, T.**

REVIEWS

Alexander, M. (Ed.) *Advances in Microbial Ecology, Vol. 5* 990
Anderson, J. M. *Ecology for Environmental Sciences: Biosphere, Ecosystems and Man* 671
Barber, H. G. & Haworth, E. Y. *A Guide to the Morphology of the Diatom Frustule* . 671
Barrett, G. W. & Rosenberg, R. (Eds) *Stress Effects on Natural Ecosystems* . . . 988
Begon, M. & Mortimer, M. *Population Ecology: a Unified Study of Animals and Plants* 312
Box, E. D. *Macroclimate and Plant Forms: An Introduction to Predictive Modeling in Phytogeography* 993
Boyle, P. R. *Molluscs and Man* 984
Bradshaw, A. D. & Chadwick, M. J. *The Restoration of Land. The Ecology and Reclamation of Derelict and Degraded Land* 314
Brook, A. J. *The Biology of Desmids* 311
Cairns, J. Jr, Patil, G. P. & Waters, W. E. *Environmental Biomonitoring, Assessment, Prediction and Management—Certain Case Studies and Related Quantitative Issues* 672
Clark, F. E. & Rosswall, T. (Eds) *Terrestrial Nitrogen Cycles: Processes, Ecosystem Strategies and Management Impacts* 672
Clark, J. R. & Benforado, J. (Eds) *Wetlands of Bottomland Hardwood Forests* . . 982
Coaker, T. H. *Advances in Applied Biology, Vol. VI* 680
Cormack, R. M., Patil, G. P. & Robson, D. S. (Eds) *Sampling Biological Populations* 316
Cushing, D. H. *Fisheries Biology: A Study in Population Dynamics* 673
Deverall, B. J. *Fungal Parasitism* 674

Dunlap, T. R. *DDT* 311
Evans, L. T. & Peacock, W. J. (Eds) *Wheat Science—Today and Tomorrow* . . . 310
Fowler, C. W. & Smith, T. D. (Eds) *Dynamics of Large Mammal Populations* . . . 984
Grassle, J. F., Patil, G. P., Smith, W. & Taillie, C. (Eds) *Ecological Diversity in Theory and Practice* 316
Green, B. *Countryside Conservation* 979
Green, R. H. *Sampling Design and Statistical Methods for Environmental Biologists* 315
Harris, K. M. & Buczacki, S. T. *Pests, Diseases and Disorders of Garden Plants* . . 305
Hillel, D. *Fundamentals of Soil Physics* 307
Hillel, D. *Applications of Soil Physics* 308
Humphreys, L. R. *Environmental Adaptation of Tropical Pasture Plants* 982
Hurd, R. G., Biscoe, P. V. & Dennis, C. *Opportunities for Increasing Crop Yields* . 313
Jones, N. V. & Wolff, W. J. (Eds) *Feeding and Survival Strategies of Estuarine Organisms* 675
Mason, C. F. *Biology of Freshwater Pollution* 983
Merrel, D. J. *Ecological Genetics* 989
Morris, I. (Ed.) *The Physiological Ecology of Phytoplankton* 306
Naiman, R. J. & Soltz, D. L. (Eds) *Fishes in the North American Deserts* 675
Neff, J. M. & Anderson, J. W. *Responses of Marine Animals to Petroleum and Specific Petroleum Hydrocarbons* 674
Newman, E. I. (Ed.) *The Plant Community as a Working Mechanism* 977
Nisbet, R. M. & Gurney, W. S. C. *Modelling Fluctuating Populations* 987
Ord, J. K., Patil, G. P. & Taillie, C. (Eds) *Statistical Distributions in Ecological Work* 676
O'Riorden, T. & Sewell, W. R. D. (Eds) *Project Appraisal and Policy Review* . . . 991
Orloci, L., Rao, C. R. & Stiteler, W. M. (Eds) *Multivariate Methods in Ecological Work* 317
Patil, G. P. & Rosenzweig, M. L. (Eds) *Contemporary Quantitative Ecology and Related Econometrics* 986
Pentreath, B. J. *Nuclear Power, Man and the Environment* 991
Persson, T. (Ed) *Structure and Function of Northern Coniferous Forests—an Ecosystem Study* 677
Peterken, G. *Woodland Conservation and Management* 978
Pimental, D. & Pimental, M. *Food, Energy and Society* 308
Rosswall, T. (Ed.) *Nitrogen Cycling in West African Ecosystems* 981
Simmons, I. G. *The Ecology of Natural Resources* 678
Sokal, R. R. & Rohlf, P. J. *The Principles and Practice of Statistics in Biological Research* 985
Specht, R. L. (Ed.) *Ecosystems of the World. Vol. 9. Heathlands and Related Shrublands: A. Descriptive Studies. B. Analytical Studies* 678
Spellerberg, I. F. *Ecological Evaluation for Conservation* 305
Thirgood, J. V. *Man and the Mediterranean Forest: a History of Research Depletion* 980
Tivy, J. *Biogeography. A Study of Plants in the Ecosphere* 992
Tivy, J. & O'Hare, G. *Human Impact on the Ecosystem* 993
Wratten, S. D. & Fry, G. L. A. *Field and Laboratory Exercises in Ecology* 309